Institute of Marine Research

CRUISE REPORT

R.V. POSEIDON Cruise No.: POS221

Dates of Cruise: 18.7.96 - 4.8.96

General Subject of Research: Sampling of active volcanism on the middle Kolbeinsey Ridge and the Eggvin Bank.

Port Calls: Kiel, Reykjavik

IfM Department / CAU Institute: Geologisch-Paläontologisches Institut

Chief Scientist: D. Colin W. Devey

Number of Scientists: 8

Project: SPAR II

1. Scientific Crew

Dr. Colin Devey	GPI
Dr. Karsten Haase	MPI
Dr. Mark Rehkämper	U. Mich.
Martin Wieneke	GPI/GK
Solveigh Laß	GPI
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GPI	- Geologisch-Paläontologisches Institut der Universität zu Kiel, Olshausenstr. 40, D-24118 Kiel, Germany
GK	- Graduiertenkolleg "Dynamik globaler Kreisläufe im System Erde" der Universität zu Kiel
MPI	- Max-Planck-Institut für Chemie, Abt. geochemie, Postfach 3060, D-55020 Mainz, Germany
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2. Reserch Programme

The cruise objectives were to extend and complete the sampling begun in 1995 with the cruise POS 210/1, concentrating on regions which were either inaccessible last year due to ice, or which have, as a result of analytical work on the POS210/1 samples, shown themselves to be regions of key importance. The three areas of interest were:

South Kolbeinsey Ridge - last year sea ice prevented the sampling of the northern-most tip of the Southern Kolbeinsey Ridge (SKR), making one of the main aims of the original sampling program unachievable. Sampling during POS221 should close this gap.

Middle Kolbeinsey Ridge - During POS210/1 the limited sampling time was concentrated on the tips of the Middle Kolbeinsey Ridge (MKR) spreading axis. Studies on the more widely-spaced samples from the central region of the MKR collected in 1995 have shown that this region of the spreading axis would also warrant more detailed sampling, allowing for the first time a detailed study of the functioning of the magma system on a slowly-spreading axis.

Eggvin Bank - During POS210/1 the southern portion of the Eggvin Ban axis was sampled in detail. An aim of POS221 was to continue this sampling to the north as far as the Jan Mayen Fracture Zone (JMFZ).

3. Report of the cruise with technical details.

The POSEIDON left Kiel on 18.7.96 at 09:00. After five days transit the ship arrived on station on the northern tip of the SKR at 68°47´N/17°29´W on 23.7.96 at 14:00 UTC. Sampling continued with 18 successful dredges (with a spacing of 1-2 nautical miles) on the SKR tip. The sampling program then jumped to the MKR, where a similar sampling density was achieved for the whole length of the segment with 25 dredge stations. At two localities one or several planned stations could not be occupied on the first pass due to sea ice. These stations were occupied during the homeward journey to Reykjavik. Following the MKR sampling, 29 dredge stations were performed on the Eggvin Bank. At Station 648DS (71°23.13´N/12°38.8´W) one of the dredges was lost at a tension of 6,2 Tonnes. The main dredging cable snapped immediately above the loop to which the dredge was attached. On the final day of station work the volcanic corer was deployed 5 times on a relatively young volcano on the SKR identified earlier in the cruise. Sample yields of between 0,2 and ca. 200g were achieved,using a core barrel packed with vaseline.

4. Scientific report and first results.

All stations on the SKR and MKR which yielded volcanic rock showed the samples to be of fresh basaltic lava. On the Eggvin Ban many samples appeared somewhat older, with pillow lavas and sheet flows showing some signs of alteration, and several dredges returning only mud. A full list of the stations performed and the samples recovered is provided in the station list in Section 6.

5. Scientific equipment, instruments etc.

The POS221 cruise used primarily dredges for sampling the axial volcanics. The dredge used was a small tubular design, with a 60cm opening and containing 100 kg weights to help keep it on the seafloor. Also deployed was the "Vulkanitstoßrohr", a volcanic corer consisting of 1,5T gravity corer weight set and a reinforced barrel ca. 50cm long and of 10cm diameter packed with vaseline.

6. Station List

The following is a station list including petrographic descriptions of the samples recovered. Following abbreviations are used:

MKR (N/M/S): Middle Kolbeinsey Ridge (N: North; M: Middle; S: South)
SKR: Southern Kolbeinsey Ridge
DS: Dredge Station
VSR: Volcanic corer

Location and depth: Coordinates and water depths given are those of the ship at first bottom contact and the end of bottom contact (the latter shown either by change in weight of the dredge, or wire length = water depth)

Station	Location	Depth	Samples taken
591DS SKR	68°47.71´N/17°29.32´W to 68°47.96´N/17°30.81´W	1400m to 1360m	Dredge contained mud + 1 dropstone
592DS SKR	68°48.48´N/17°24.37´W to 68°48.17´N/17°25.78´W	1200m to 1300m	-1: Sheet flow, 5% vesicles, plag.phenos, 1cm glass -2: Sheet flow, glassy, non-vesicular -3: similar to -2
593DS SKR	68°48.40´N/17°22.04´W to 68°48.16´N/17°20.86´W	1230m to 1240m	-1: Pillow, 5mm glass, vesicles <5mm, MnFe crust -2: Vesicular pillow, thin glass rim -3: Pillow, thin glass crust, 5% vesicles -4: Pillow, vesiclepoor, thin glass
594DS SKR	68°50.00´N/17°23.82´W to 68°50.28´N/17°23.45´W	1270m	-1: Pillow, glass up to 3-4mm, plag phenos, thin MnFe crust -2: Pillow, plag phenos <2mm, no glass, marginal vesicles -3: Pillow, no glass, plag phenos 1mm, vesicles 1-2mm -4: Pillow, plag phenos, FeMn coating, little glass -5, -6, -7 similar to above
595DS SKR	68°51.37´N/17°23.44´W to 68°51.83´N/17°22.91´W	1350m to 1400m	-1: Pillow, 3mm glass, vesicle-rich, 2mm plag phenos -2: similar to -1 -3: Pillow, 1mm glass, vesicle-rich, <2mm plag phenos
596DS SKR	68°52.29´N/17°21.75´W to 68°52.64´N/17°22.00´W	1350m to 1300m	-1: Pillow, 5mm glass, vesicles, rare 1mm plag phenos
597DS SKR	68°53.29´N/17°19.83´W to 68°53.22´N/17°20.33´W	1330m to 1370m	-1: Pillow, 1-2mm vesicles, 1-2mm plag phenos -2: Sheet flow, up to 5mm vesicles, fewer phenos than -1 -3: Sheet flow, vesicles 5mm, 1-2mm plag phenos
598DS SKR	68°54.70´N/17°18.11´W to 68°54.97´N/18°17.35´W	1410m to 1510m	-1: Pillow, 5mm glass, 1mm vesicles, few 1mm plag phenos
599DS SKR	68°55.84´N/17°16.01´W to 68°55.35´N/17°16.79´W	1470m to 1400m	Empty

600DS SKR	68°55.92´N/17°15.80´W to 68°55.41´N/17°18.40´W	1400m to 1410m	-1: Pillow, 1cm glass, vesicle rich, 1mm plag phenos -2: Pillow, 1-2mm vesicles, 1mm plag phenos -3: Pillow, large vesicles, plag phenos -4: Pillow, vesicle rich, 0.5mm plag phenos -5: Pillow, 1-5mm glass, 0.5-2mm vesicles, 1mm plag phenos
601DS SKR Volcano J (see stations 669DS - 679VSR)	68°58.99´N/17°12.83´W to 68°56.84´N/17°10.81´W	1200m to 1250m	-1: Sheet flow, fresh, vesicle-poor, glass, 5mm plag phenos, fresh -2: Pillow, 1mm glass, vesicles -3: like -2, more glass -4: Hydrothermal Mn-crust, layered -5: Hydrothermally altered pillow -6: Fe-OH crust, 4-5 cm thick
602DS SKR Volcano J	68°57.23´N/17°13.10´W to 68°57.04´N/17°12.57´W	1420m to 1220m	-1: Pillow, thick fresh glass -2: Pillow, some vesicles, plag phenos, Mn-Fe coating, altered, no glass -3: Pillow, less altered than -2, 5% vesicles, plag phenos -4: Pillow, 1-3mm glass, many 5mm vesicles, plag phenos -5: as -4 but with smaller vesicles -6: Pillow, 1mm glass, 1-2mm plag phenos, 1mm vesicles
603DS SKR	68°58.09´N/17°10.30´W to 68°57.53´N/17°09.95´W	1450m to 1420m	-1: Sheet flow, altered 1-2mm glass, plag phenos <8mm, vesicle sizes 0.2, 1-2, cm-scale -2: Sheet flow, ropy surface -3: Sheet flow, glassy
604DS SKR	68°59.05´N/17°07.28´W to 68°58.80´N/17°06.20´W	1530m to 1580m	-1: Sheet flow, 1-3cm glass rim -2: Sheet flow, altered 1-2 mm glass, 0.5-1mm vesicles, plag+ol phenos < 1mm
605DS SKR	68°59.91´N/17°04.61´W to 68°59.10´N/17°02.82´W	1500m to 1750m	-1: Pillow, 1cm glass, 2-5mm vesicles, rare plag phenos -2: Pillow, similar to -1
606DS SKR	69°00.57´N/17°02.59´W to 69°00.65´N/17°03.50´W	1700m to 1600m	-1: Pillow, fresh, 1cm glass, few small vesicles, <1mm plag + ol phenos -2: Pillow, fresher than -1, 1cm glass -3: Piece of glass crust
607DS SKR	69°01.93´N/16°59.71´W to 69°01.11´N/17°02.65´W	1650m	Empty
608DS SKR	69°02.57´N/16°58.67´W to 69°02.33´N/17°00.87´W	1720m to 1620m	-1: Pillow, 2-5mm glass, plag phenos, vesicles -2: Sheet flow, 5-10mm glass, 0.5-1mm plag phenos, 1-2mm vesicles -3: Pillow, 1-2mm glass, 1mm plag phenos -4: Sheet flow, 0.5mm plag phenos, 2-3mm glass, vesicles -5: Pillow, 1-2mm glass, plag phenos, vesicles -6: Pillow, 1mm glass, vesicles 0.5mm
609DS MKR	69°10.04´N/16°09.07´W to 69°10.46´N/16°09.36´W	1138m to 1030m	-1: Pillow, 2-5mm glass, vesicle-rich 0.5-5mm -2: Pillow, 2-20mm glass, vesicles 0.1-7mm, rare plag phenos -3: Sheet flow, 2-15mm glass, small vesicles -4: Pillow, 0.5-1mm glass, rare small plag phenos -5: Pillow, 1-2mm vesicles, 1mm glass
610DS MKR	69°11,93´N/16°07.19´W to 69°12.36´N/16°06.86´W	1216m to 1134m	-1: Pillow, 1-2mm glass, vesicles and cavities -2: Pillow, 1cm glass, plag phenos up to 10mm -3: Sheet flow, 5mm glass, 10mm plag phenos -4: Sheet flow, 5-10mm glass on both sides, 2mm plag phenos -5: Sheet flow, 1mm vesicles, rare 0.5mm plag phenos

611DS MKR	69°15.95´N/16°04.10W to 69°16.22´N/16°03.90´W	1195m to 1100m	Empty
612DS MKR	69°16.06´N/16°03.97´W to 69°16.37´N/16°05.50´W	1170m to 975m	-1: Pillow, 1-10mm glass, small rare plag + ol phenos -2: Sheet flow, 1cm glass, plag + ol phenos -3: Pillow, 1-3mm glass, altered, ol + plag phenos -4: Sheet flow, 5mm glass, vesicles < 0.5mm -5: Pillow, 1-2mm glass, altered -6: Sheet flow, 1mm glass, fresher than -2 or -4
613DS MKR	69°26.76´N/15°53.76´W to 69°27.03´N/15°53.44´W	1050m to 1000m	-1: Sheet flow, 2cm glass, 1mm vesicles
614DS MKR	69°28.93´N/15°52.11´W to 69°29.33´N/15°51.71´W	1100m to 1110m	-1: Pillow, 2-3mm glass, rare small phenos, vesicles -2: Pillow, 5mm glass, vesicles + phenos as -1 -3: Pillow, 5mm glas, as -1 and -2 -4: Pillow, no glass, , rare phenos, 3-4mm vesicles -5: as -4 -6: Sheet flow
615DS MKR	69°31.61´N/15°5070´W to 69°31.96´N/15°49.72´W	1010m to 1000m	-1: Pillow, vesicular, aphyric, glass, fresh -2: Sheet flow, vesicular, aphyric, glass, fresh -3: Pillow core, vesicular, older-looking -4: Pillow, vesicular, glassy, aphyric, altered -5: Glass, ca. 10g -6: Pillow, vesicular, aphyric, glass, fresh
616DS MKR	69°31.98´N/15°48.63´W to 69°32.44´N/15°47.92´W	1092m to 1070m	-1: Pillow, 5mm glass -2: Pillow, 5mm glass, 1-2mm vesicles -3: Sheet flow, 90% glass